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Coalition Governments and Policy Reform with Asymmetric Information

by

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With ideological parties being better informed about the state of the world than voters, the true motivation of policy proposals is hard to judge for the electorate. However, if reform proposals have to be agreed upon by government members with heterogeneous policy preferences, it may become possible for the government to signal to the voters its private information about the necessity of reforms. This provides a rationale why coalition governments may find it easier to implement reforms than single-party governments, why oversized coalitions are formed, and why governments sometimes have cabinet members from opposing parties. (JEL: D72, D78, D82)

1 Introduction

Asymmetric information between policymakers and voters seems to be an almost systemic feature of democracies. Typically, governments have large administrations with specialists working for them, they have resources that can be spent on obtaining external expertise, and in some instances – such as security issues – they have access to documents that are not disseminated to the public. As a consequence, insight into the facts is often better for governments than for voters.

When policymakers are motivated ideologically, asymmetric information leads to a moral-hazard problem. A policymaker may offer a distorted presentation of the available information so as to find approval for policies that conform to his own preferences rather than those of the voters. Consequently, when the voter is confronted with a reform proposal, he is unsure about how to assess it. Does it merely reflect the policymakers' ideological position on a policy, or is it also beneficial to the voter? Confronted with this uncertainty, he may oppose reform proposals even

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if he would have agreed to the policy change had he known the true state of the world.

In this paper, we show that a heterogeneous government that includes members with different policy preferences may find it easier to achieve acceptance of policy reforms than a more homogeneous government. The reason is that differences in policy preferences provide a safeguard against reform proposals that are too much biased towards the interests of a single party. This improves the credibility of a government and facilitates the signaling of private information. Based on this idea, we develop a simple theoretical model that is able to explain the following stylized facts (for which related empirical evidence is discussed further below): (a) coalition governments are sometimes more successful in implementing reforms than single-party governments, despite the greater number of veto players; (b) a substantial fraction of coalition governments are oversized; and (c) some governments have cabinet members from opposing parties.

Veto players: Consider the following case. Due to the moral-hazard problem, a leftist party cannot credibly transmit information that supports a leftist policy reform. Now suppose that the leftist party forms a coalition with a centrist party whose policy preferences lie further to the right, and policy proposals are the outcome of coalitional bargaining. On the one hand, this complicates the decision-making process. On the other hand, by tying its hands to a partner the leftist party gains in credibility when proposing a leftist policy, because the centrist party would not have accepted such a proposal unless it is actually supported by the available information. Hence, a coalition government may find it easier to get public support for those reforms that are also in the interest of the voters. This is beneficial not only for the voters and the coalition-joining partner, but usually also for the party that in the original situation had a majority on its own.

Germany's policy towards the German Democratic Republic (GDR) and the Soviet Union at the end of the sixties and beginning of the seventies serves as an illustrative example (Fink and Schaefer (eds.), 2009). Part of the so-called *Neue Ostpolitik* (new eastern policy) was the Treaty of Moscow, which stated that the Oder-Neisse border between the GDR and Poland would not be called into question. Furthermore, the Federal Republic of Germany (West Germany) declared its renouncement of the right to exclusive agency of Germany. This move in foreign policy was a key policy issue of a coalition government, which consisted of a leftist party (SPD) that supplied the chancellor (Willy Brandt) and a small coalition partner (FDP) further to the right in the political spectrum that provided the foreign minister (Walter Scheel).

The *Neue Ostpolitik* was also a very controversial policy issue and led to a vote of no confidence in the German Bundestag on September 20th, 1972. As members of the cabinet deliberately abstained, Willy Brandt lost and new elections were called for. Although citizens were asked to vote for a new parliament, the election was considered as one where people would actually vote on the *Neue Ostpolitik*. The election was won by the social-liberal coalition, with the SPD receiving a vote share of 45.8% and the FDP receiving a vote share of 8.4%.

Arguably, the calling of the election can be interpreted as a coalition government asking the electorate for approval of an important reform. Moreover, the more moderate liberal party seems to have helped solve a credibility problem of the SPD. At that time, the party had often been accused of being close to communist thinking, so that without the FDP and its foreign minister, the public might have considered the *Neue Ostpolitik* ideological politics, rather than an appropriate answer to the challenges at that time.

Oversized coalitions: In an oversized coalition at least one party can be removed without the remaining members losing their majority. Accordingly, the inclusion of such a coalition partner is not a necessity to obtain a majority – as we assume in the section on veto players – but a strategic decision. Evidence collected by Volden and Carruba (2004) on 24 countries from years between 1955 and 1998 states that 19% of the observed coalitions were oversized. The puzzle is why governments that already hold a majority invite further parties to join. Our explanation focuses on credible information transmission. We argue that inviting an additional party into the government (although the incumbent already has a majority) may help overcome the asymmetric-information problem, and reform policies become more likely to be implemented.

Cabinet members from opposing parties: Finally, our mechanism sheds light on why a government allocates cabinet positions to members of the opposing party. Again, this is an empirically relevant phenomenon, as can be seen from most recent as well as past U.S. presidential cabinets. President Obama appointed a Republican as secretary of transportation, whereas President George W. Bush had had the same position occupied by a Democrat. President Clinton appointed a Republican defense secretary, as had already been done by President Roosevelt, a Democrat, who had two Republicans serving as Secretary of the Navy and Secretary of War. Inviting members from opposing parties into a government is a strategic decision that, in our model, may improve the government's credibility for the voter and thereby facilitate credible information transmission. As a consequence, it may help the incumbent government to get approval for reform policies that it otherwise would not have achieved.

An Appendix contains all proofs.

2 Related Literature

Veto-player theory argues that the implementation of reforms is more difficult in coalition than in single-party governments (Tsebelis, 2002). However, the empirical evidence on the veto-player theory is mixed. Some studies find that in democracies in which veto players are more prevalent, labor regulation, the government's budget composition, and trade policies are indeed less likely to be changed (Tsebelis, 1999; Chang and Tsebelis, 2004; O'Reilly, 2005). But there is also evidence against the veto-player theory. Tavares (2004) shows that coalition governments are actually more likely to implement successful fiscal adjustments. Focusing on postcommunist

countries, Bodenstein and Schneider (2006) find that veto players help rather than inhibit foreign economic liberalization. Also, the studies by Boockmann (2006) on the ratification probabilities of labor standard conventions of the ILO and by Immergut and Anderson (2007) on pension reforms did not find support for the veto-player argument.

While this paper focuses on credible information transmission to explain the mixed evidence of the veto-player theory, other recent contributions exist that have followed a different approach. Lindvall (2010) shows that the likelihood of a reform may not be related to the number of veto players, but to the policies that can be used to compensate veto players. Gehlbach and Malesky (2010) show that more veto players may lead to more efficient reforms because they weaken the power of special interest groups. Finally, Tommasi, Scartascini, and Stein (2011) extend the veto-player theory to the dynamic setting of an infinitely repeated game, and show that more veto players might make deviation from the cooperative equilibrium less appealing.

Turning to oversized coalitions, in an early contribution Axelrod (1970) argued that they would arise because governing parties' utility increases with decreasing variance in policy positions among coalition partners. Different reasoning was put forward by Crombez (1996), who argued that in an oversized coalition the leading party has the possibility to reshuffle cabinet posts without losing majority support. Referring to side payments, Baron and Diermeier (2001) showed that an extreme status quo policy induces oversized coalitions because it allows the leading party to extract more concessions from the other members of the coalition. In Carrubba and Volden (2000) various explanations were suggested, including that oversized coalitions form when parliaments are composed of more diverse actors or when logrolling is more costly. Finally, according to Lijphard (1984), oversized coalitions are formed in bicameral systems in order to add parties that are needed to control the upper house. Contrary to these approaches, our contribution relies on credible information transmission in coalition governments, which may support policy reform and improve parties' payoffs.

Our paper is also related to other studies that emphasize the role of private information for policy reforms.[1] Lupia (1992, 1994) shows how badly informed voters may infer information from agenda-setters when contesting an election is costly, or when a policy can be endorsed by third parties. Gilligan and Krehbiel (1989) analyze policy outcomes when legislatures delegate certain tasks to a better-informed and heterogeneous committee, comparing open, modified, and closed procedural rules.

As in our approach, signaling is also central for policy reforms in the contribution by Cukierman and Tommasi (1995, 1998a,b). They show how the voter may derive valuable information on the actual necessity of the reform from the incongruence

[1] For excellent surveys on the political economy of reforms see Roland (2002) and Drazen (2000); Sturzenegger and Tommasi (eds.) (1998) contains a collection of highly recommendable related articles.

of the proposal with the political leaning of the proposer. The general argument is made within two distinct collective decision rules. One of them is, as we propose, a referendum, and in the other, general elections are held. The main findings are that moderate right-wing policies are more likely to be implemented by right-wing parties (and likewise for left-wing policies and left-wing parties). However, for extreme policies they show that it takes the party from the opposite side of the political spectrum to implement the policy change. Our contribution differs from theirs in that we look into the role of coalition partners to facilitate reforms. With respect to their findings, Cukierman and Tommasi (1998b) show how on a one-dimensional political spectrum a party to the left of the median voter (leftist party) may be more able to signal the need for a policy to the right of the median voter (rightist policy). By contrast, we show how a coalition may make it easier for a leftist party to signal the need for a leftist policy, i.e., for a policy that coincides with its policy preferences.

Conveying information to voters via heterogeneous preferences of policymakers also plays a central role in a range of models on electoral competition (see Roemer, 1994; Schultz, 1996; Martinelli, 2001). In all these examples, akin to our model, the actions of one player, who has a different policy stance from that of the voters or the other political actors, convey information about the true state of the world.

The paper proceeds as follows. In section 3, we set out the basic model and explain the timing for the cases of a single-party and a coalition government. In sections 4 and 5 we determine the separating and pooling equilibria for these government structures. By comparison we show that a coalition often facilitates implementation of a policy reform and improves the payoffs of both parties and of the voters (section 6). Then we extend our model by modeling the choice to invite a coalition partner (or an external minister) and the choice to accept this invitation as strategic moves. This enables us to analyze the conditions under which oversized coalitions are formed or governments include cabinet members from opposing parties. In the concluding section 8 we summarize the main findings.

3 The Model

We study the outcome of a game between a government that proposes a policy change and the voters (V), who may approve or vote down the policy proposal in a referendum. In the first case that we consider there are two parties: a leftist (L) and a rightist (R) one. In the other cases there is also a third, centrist (C) player, which is interpreted alternatively as another party or a cabinet member that does not belong to the governing party.

For all players $i = L, C, R, V$, their payoff u_i decreases quadratically in the distance between their bliss point, $a_i + \gamma$, and the policy $x \in \mathbb{R}$:

$$u_i = -[x - (a_i + \gamma)]^2 . \tag{1}$$

The actors' bliss points depend on their individual policy preferences, $a_i \in \mathbb{R}$, and a common, exogenous policy shock γ. While all actors observe whether a shock has occurred, the government has private information over its realization and, therefore, over the optimal policy response. For example, while the voters observe the phenomenon of globalization, they are unsure whether the optimal policy response is one of protectionism (a "leftist" policy) or of liberalization (a "rightist" policy). Similarly, the voters may observe an increased level of unemployment, but be unsure whether the best response is a tightening or a loosening of employment protection laws.

We capture this idea by assuming that γ is a random variable of which the voters only know the following prior distribution (which is common knowledge):

$$\gamma = \begin{cases} b & \text{with probability } 0.5\,, \\ -b & \text{with probability } 0.5\,, \end{cases}$$

where $b > 0$, and we refer to $\gamma = b$ as a rightist shock and to $\gamma = -b$ as a leftist shock. By contrast, the members of the government observe the true realization of γ for the reasons spelled out earlier – they have large administrations gathering information, costly external advice can be bought, and some documents typically cannot be disseminated to the public for security reasons.

We now impose some restrictions on the policy preferences of the players and then discuss their motivation.

ASSUMPTION 1 $a_L < 0 < a_R$.

ASSUMPTION 2 $|a_C| < |a_L| < |a_R|$.

ASSUMPTION 3 $|a_C| < 2b$.

ASSUMPTION 4 *The voters' individual policy preferences are distributed uniformly and symmetrically around* 0 *with maximum support* $\overline{a} \geq a_R$.

Assumption 1 ranks preferences of the leftist and rightist parties in the natural order. Assumption 2 states that the centrist party's preferences are the least extreme, and those of the rightist party are the most extreme. The latter assures, together with Assumption 4, that party L holds a majority in the two-party system.[2]

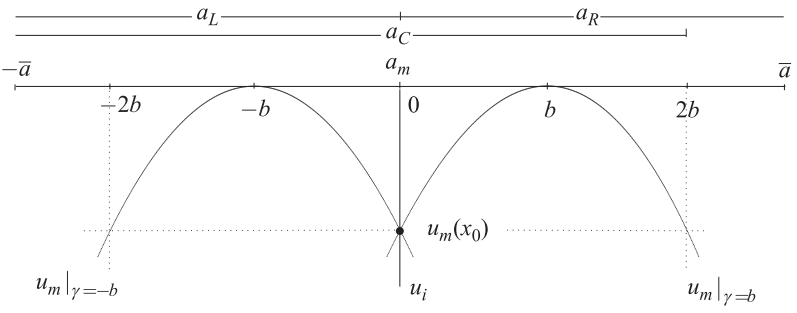
Moreover, the assumptions imply that none of the parties holds a majority in the three-party system, so that a coalition government emerges. Specifically, party C gets half of the voters with preferences in the interval $[a_L, a_C]$ and half of the voters with preferences in the interval $[a_C, a_R]$. Given our assumptions $\overline{a} \geq a_R$ and $|a_R| > |a_L|$, there will be some voters to the left of a_L, so that party C gets less than 50% of the votes. In addition, $|a_C| < |a_L|$ assures that party L does not have a majority.

[2] Results for the case $|a_L| > |a_R|$ follow straightforwardly on exchanging the roles of the two parties in the remainder of the text.

Assumption 3 states that the centrist party does not have extremely rightist preferences.[3] Finally, Assumption 4 implies that the median voter, indexed m, has policy preferences $a_m = 0$.

Figure 1 depicts the above assumptions, as well as the payoff function of the median voter for the cases $\gamma = -b$ and $\gamma = b$. Note that $u_m(x_0)$ denotes the median voter's utility at the status quo policy, which we normalize to $x_0 = 0$.

Figure 1
Preferences

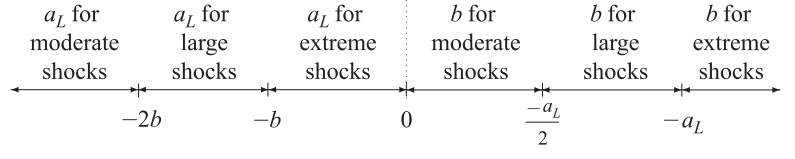


The ability to implement reforms will depend on the size of the shock. Therefore, we distinguish three cases:

(i) moderate shocks: $b \leq -a_L/2$,
(ii) large shocks: $-a_L/2 < b < -a_L$,
(iii) extreme shocks: $b \geq -a_L$.

Here, the size of the shock is expressed relative to party L's inherent policy preferences. This is depicted in the positive part of Figure 2. The perspective can be reversed so that a moderate shock corresponds to extreme preferences of party L, and so on. This is depicted in the negative part of Figure 2. Adopting the latter perspective, a rightist shock is moderate when the leftist party still prefers its

Figure 2
Classification of Shocks



[3] In particular, we allow for the case that C prefers a rightist policy despite a leftist shock. However, by Assumption 3 it then prefers the status quo, $x_0 = 0$, to its original policy preference a_C (which requires that $2(a_C - b) < a_C$ or, equivalently, $a_C < 2b$).

original ideal point, a_L, to the status quo. This is no longer the case if the rightist shock is large; but the bliss point of the leftist party remains to the left of the status quo, i.e., $a_L + b < 0$. Finally, if the rightist shock is extreme, then L's bliss point shifts to the right of the status quo.

Note that the size of the shock should not be confused with the importance of the underlying policy issue for the voters. For example, the *Neue Ostpolitik* that we discussed in the Introduction is generally regarded as one of Germany's most important foreign policy decisions. Nevertheless, using the above terminology, the underlying shock still qualifies as moderate or large, because it did not reverse the inherent policy preferences of the rightist CDU (Christian Democratic Union), which opposed this policy move.

We assume that the government proposes a policy $x_p \in \mathbb{R}$ to the voters. Subsequently, the voters decide in the referendum whether to accept or reject the proposal. If it is rejected, then the status quo policy, $x_0 = 0$, will be implemented. Thus we model a situation where a government already exists, but a certain policy needs approval by the voters.

A literal interpretation of this setup can be motivated by noting that referenda are of increasing importance as a political decision mechanism (Butler and Ranney (eds.), 1994). Recently, the ratification of international treaties in the European Union has been done through referenda in a range of member countries. They also play an important role in central and eastern European countries (Auer and Bützer (eds.), 2001). In a broader interpretation, the referendum may also be seen as a modeling device to capture the idea that a government needs public support for its policies, especially if it wants to be reelected. If opposition is too strong, the government may not be able to implement specific policies even though it holds a majority in the legislature. Thus, one may also think of a "virtual" referendum, which takes the form of an opinion poll.[4]

We are interested in whether a coalition government whose members have heterogeneous preferences is better able than a single-party government to implement reform policies by signaling private information about a policy shock. For this purpose, we first analyze the two-party case where the leftist party L has a majority, so that it can determine the policy proposal that it puts on the agenda. We compare this with two scenarios in which party L governs together with a player C that has different policy preferences. In the first case, the voting outcome is such that L no longer obtains a majority on its own and must form a coalition with C. In the second case, L could govern alone but may decide to invite a partner with preferences a_C

[4] For empirical evidence that politics responds to opinion polls see, e.g., Page and Shapiro (1983). Referendum games have been used, e.g., by Lupia (1992) and Cukierman and Tommasi (1998a). An alternative approach would be to replace the referendum about a specific policy by a general election of parties, as in Cukierman and Tommasi (1998b). However, these authors model a situation with only two parties, so that the voting decision essentially boils down to a decision about the dominating policy issue. This is not the case in our model, because rational voters would also take account of the strategic considerations of coalition formation.

into the government. This partner can be another party – leading to an oversized coalition – or just a cabinet member that does not belong to party L.

After the election of the government, the timing is as follows. In the regime where party L governs alone:

(1) Nature draws type $\gamma \in \{b, -b\}$ with probabilities 0.5, respectively.
(2) The members of government (but not the voters) observe the realization of γ.
(3) Party L decides on the policy x_p that it presents to the voters in a referendum.
(4) The voters decide whether to accept or to reject the policy proposal x_p, and payoffs are realized.

In the coalition regimes, at stage 3 the coalition partners bargain about the policy proposal. We will discuss this process further below. Finally, in the scenario where L has a majority but can invite a partner into the government, the above game is preceded by two stages at which L invites a partner and the partner decides whether to accept this invitation. We assume that political parties and voters always accept a policy proposal if they are indifferent.

This is a dynamic game with incomplete information. In the next two sections, we identify *perfect Bayesian equilibria* (PBEs) for the two regimes, thereby focusing on pure strategies.

4 Equilibrium with Single-Party Government

As the preferences of the individual voters are single-peaked (see (1)), the electorate can be represented by the median voter, whose policy preferences are $a_m = 0$ (by Assumption 4). Therefore, if party L governs alone, there are only two players: party L, which suggests a policy x_p, and the median voter, who decides whether to accept or reject the proposal. A PBE of this game consists of strategies for the party and the median voter as well as the median voter's beliefs over γ such that (see Fudenberg and Tirole, 1991): (i) The median voter's strategy is optimal given party L's strategy and his beliefs; (ii) party L's strategy is optimal given the median voter's strategy and beliefs; and (iii) beliefs are derived from the party's strategy using Bayes's rule where possible.

4.1 Analysis of Separating Equilibrium

In a separating equilibrium, party L makes different policy proposals depending on whether a leftist or a rightist shock has occurred, which is denoted x_l and x_r respectively (i.e., $x_l \equiv x_p(-b)$ and $x_r \equiv x_p(b)$). Upon receiving the signal x_l, the median voter believes that a leftist policy is required. Given this belief, he accepts a policy proposal iff $x_l \in [-2b, 0]$, because this would (weakly) improve his payoff relative to the status quo (see Figure 1). Similarly, if he receives the signal x_r, he believes that a rightist policy is required and accepts a policy proposal iff $x_r \in [0, 2b]$.

Given the median voter's strategy and beliefs, the best response of party L depends on the size of the shock and its direction. First, consider a leftist shock so that L's

bliss point is $a_L - b$. Using the case distinction that is depicted in Figure 2, a moderate shock implies $a_L - b \leq -3b$ and a large shock $a_L - b < -2b$. In both cases party L prefers the policy $x = -2b$ to any policy $x > -2b$. Hence the best proposal that would be accepted by the median voter is $x_p = -2b$. By contrast, if the shock is extreme, then party L's best proposal is to suggest its bliss point $a_L - b \geq -2b$.

Next, consider a rightist shock. If it is extreme, then party L's most preferred policy proposal is its bliss point, $x_r = a_L + b \geq 0$, which the voter would accept. If the shock is large, an optimal strategy for L is again to suggest its bliss point, $x_r = a_L + b \in (-b, 0)$; but this would now be rejected by the voter, so that the status quo prevails. To see that no better equilibrium proposal exists, note that any such proposal $x_r \in (-2b, 0)$ would also be rejected, given the voters' beliefs that a rightist shock has occurred. Moreover, L has no interest in wrongly claiming that the shock has been leftist, because it prefers the status quo over the policy $x = -2b$.

Finally, consider a moderate rightist shock, for which $a_L + b \leq -b$. In any separating equilibrium, party L's policy proposal must satisfy $x_r > x_l = -2b$. Obviously, L does not suggest a rightist policy. Hence the only equilibrium candidates are either proposals $x_r \in (-2b, 0)$ that would be rejected by the voter because this signals a rightist shock, or $x_r = 0$. In both cases, the status quo would prevail. However, L now prefers the equilibrium policy for a leftist shock over the status quo. Therefore, pretending a leftist shock by sending the signal $x_l = -2b$, which the median voter would (erroneously) accept given his beliefs, would constitute a profitable deviation. Hence there cannot exist a separating equilibrium for moderate shocks. Intuitively, if party L prefers the leftist policy even in the case of a rightist shock, it cannot credibly signal the type of the shock to the median voter.

Above we have identified separating PBEs and shock sizes for which none exists. We have not addressed the issue of multiple equilibria. However, noting that in a PBE of a signaling game there are no restrictions on beliefs off the equilibrium path, it is straightforward to see that other PBEs exist. For example, consider a large leftist shock and an equilibrium policy $x_l^* = -b$. Specify the voters' beliefs off the equilibrium path as follows: for any proposal $x_p < -b$, the shock is rightist with probability 1. In this case the median voter would reject any $x_p < -b$, so that party L has no profitable deviation.

However, the mentioned beliefs obviously make no sense. To exclude such cases, refinements of the PBE exist that require beliefs off the equilibrium path to be "reasonable." We use the following equilibrium-dominance-based refinement: A policy proposal x_p is equilibrium-dominated in the case of a shock of type γ if for any beliefs and resulting equilibrium decision of the median voter that might follow this proposal it yields a payoff below party L's equilibrium payoff with a shock of type γ. A PBE has *reasonable beliefs* if the voters' beliefs off the equilibrium path place zero probability on this type (provided that a proposal is not equilibrium-dominated for L independent of the type of the shock).[5]

[5] To state the last sentence more formally, for each policy proposal denote by $\Gamma^*(x_p)$ the set of types for which x_p is not equilibrium-dominated. A PBE has

Applying this refinement to the above results, we obtain the following proposition.

PROPOSITION 1 (SEPARATING EQUILIBRIA IF PARTY L GOVERNS ALONE)

(a) For moderate shocks, no separating PBE exists.
(b) For a large leftist shock, the equilibrium policy is $x_l^* = -2b$. For a large rightist shock, there will be no reforms.
(c) For an extreme leftist shock, the equilibrium policy is $x_l^* = a_L - b$. For an extreme rightist shock, it is $x_r^* = a_L + b \geq 0$.
(d) No other separating PBE exists that has reasonable beliefs.

In conclusion, if a single-party government can implement reforms, then they will always have the right direction. However, signaling requires that shocks be sufficiently large.

4.2 Analysis of Pooling Equilibrium

In a pooling equilibrium party L makes the same policy proposal, denoted x_p^*, independent of the direction of the shock (i.e., $x_p^*(-b) = x_p^*(b)$). To determine a PBE that involves pooling, we start by identifying a candidate for an equilibrium proposal and analyze the players' behavior along the equilibrium path. Then we prove that no player has a profitable deviation, relegating the application of the reasonable-beliefs refinement to the Appendix.

Using backward induction, we first consider the median voter's strategy. In a PBE his beliefs along the equilibrium path must be consistent with party L's strategy. Hence in a pooling equilibrium his beliefs equal the priors, according to which a rightist shock and a leftist shock occur with the same probability 0.5. The median voter will only accept an equilibrium policy proposal x_p^* if it yields at least the same expected payoff as the status quo $x_0 = 0$. This is the case iff

$$-\left(x_p^* - b\right)^2 - \left(x_p^* + b\right)^2 \geq -b^2 - b^2$$
$$\iff \quad -\left(x_p^*\right)^2 \geq 0\,.$$

Accordingly, the only equilibrium proposal that the median voter accepts is the status quo, i.e., $x_p^* = 0$. This reflects that pooling involves no information transmission. From Proposition 1, it follows immediately that for large and extreme shocks party L prefers the separating equilibrium over a pooling equilibrium that simply replicates the status quo. In the proof of Proposition 2 below we show that for these cases there exists no pooling equilibrium that has reasonable beliefs.

Turning to moderate shocks, obviously L will never suggest a rightist policy $x_p > 0$. Conversely, deviations to a very leftist proposal, $x_p < -2b$, would be rejected

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reasonable beliefs if for all proposals with $\Gamma^*(x_p) \neq \emptyset$ the voters' beliefs satisfy $\Pr[\gamma | x_p] > 0$ only if $\gamma \in \Gamma^*(x_p)$. Moreover, note that in a signaling game with two types like ours, this equilibrium-dominance-based refinement is equivalent to the intuitive criterion proposed by Cho and Kreps (1987) (see, e.g., Fudenberg and Tirole, 1991).

by the voter independently of his beliefs. However, party L and the voter would both prefer a leftist proposal $x_p \in [-2b, 0)$ to the status quo, if a moderate leftist shock had occurred.

To analyze whether the voter would indeed accept such a proposal, we need to specify his beliefs off the equilibrium path. Party L prefers a policy $x_p \in [-2b, 0)$ to the status quo, independently of the direction of the shock. Therefore, the equilibrium-dominance-based refinement imposes no restrictions on beliefs in this range, and we assume that the voter's beliefs equal the priors for such proposals. Accordingly, from the above analysis the voter would reject any such biased proposal.

PROPOSITION 2 *If party L governs alone, then a pooling PBE that has reasonable beliefs exists only for moderate shocks. It leads to the status quo.*

For a single-party government the above analysis has shown that extreme shocks always lead to reforms, and large shocks do so if the direction of the shock coincides with the policy preferences of the ruling party. Moreover, for a large rightist shock, party L prefers the status quo to a rightist reform and therefore would veto any such proposal in a coalition government. By contrast, for moderate shocks reform proposals do not find approval by the voter, because the size of the shock is dominated by the inherent policy preferences of the ruling party. Hence it cannot credibly signal the direction of a shock.

In the rest of the paper we analyze whether a coalition partner with different preferences helps a government to gain credibility among the voters, thereby leading to better policy outcomes. We start by considering the case where a coalition government is necessary to obtain a majority.

5 *Equilibrium with Coalition Government*

In order to analyze coalitions, we now assume that there is a third, centrist party, whose preferences lie in between those of the leftist and the rightist party. Given Assumptions 1 to 3 on the actors' preferences, no single party will obtain a majority in the national general elections. Instead, we assume that the leftist and the centrist party form a coalition government. In such a coalition, the credibility towards the voters when suggesting a leftist policy is increased because it has been negotiated with party C, whose policy preferences lie further to the right of the political spectrum. In the case of moderate shocks this will enable the coalition to signal a leftist shock so that – in contrast to the single-party government – a separating equilibrium now exists, provided that C's preferences are not too far rightist. As a consequence, a moderate leftist shock will lead to a leftist reform.

We do not explicitly model the bargaining process within the coalition, as this would substantially complicate the analysis. Instead, we focus on the boundary case where party L is the dominating coalition member that can present policy proposals as take-it-or-leave-it offers to its coalition partner. This choice has been made with

section 7 in mind, in which L has a majority on its own, so that it appears natural to assume that it has superior bargaining power.[6] Accordingly, after nature has drawn type γ and that is revealed to the coalition partners, the game proceeds as follows. In the first stage, party L suggests a policy proposal that C can reject or accept. If it rejects, the game is over and the status quo persists. If it accepts, the coalition passes the proposal to the voters, who then also decide whether to accept or to reject it. Hence party C is in the position of a veto player. From a modeling point of view, C need not even have a veto right; it would be sufficient that as a member of government it knows the direction of the shock and can give a recommendation about the policy proposal to the voters. However, a scenario where a coalition partner recommends rejecting the policy proposal of a government of which it is member itself appears unusual. It seems more common that coalition partners first solve their conflicts of interest internally and then come out with a compromise to the voter. This is the approach that we have taken.

As in section 4, we start by analyzing separating equilibria.

5.1 Analysis of Separating Equilibrium with Coalition

First, consider a leftist shock that is signaled to the median voter. Hence he would accept policy proposals $x_l \in [-2b, 0]$. Moreover, using Assumption 2 and the case distinctions from section 3, for an extreme shock the bliss points are located as follows: $-2b \leq a_L - b < a_C - b < 0$. Accordingly, party L's most preferred policy proposal that is approved by the voter in a separating equilibrium and also by C is $x_l = \max\{a_L - b, 2a_C - 2b\} < 0$.

For large and moderate leftist shocks, C's policy preferences may be sufficiently rightist to yield $a_C \geq b$. In this case, C would not accept a leftist proposal, while L would not accept a rightist proposal. Hence the coalition members will not agree on any proposal that differs from the status quo. Turning to the case $a_C - b < 0$, note that for large and moderate shocks $a_L - b < -2b$ (see Figure 2). Hence the most preferred proposal that is accepted by the voter and C is $x_l = \max\{-2b, 2a_C - 2b\} < 0$.

Next, consider a rightist shock that is signaled to the median voter so that he would accept proposals $x_r \in [0, 2b]$. For an extreme shock, the location of the bliss points is $0 \leq a_L + b < a_C + b < 2b$ (the last inequality follows from Assumption 2 and the case distinction). Accordingly, L's bliss point would be accepted as a policy proposal by C and the voter.

For large and moderate rightist shocks, party L prefers a leftist policy and the median voter a rightist policy. Hence, there cannot be a separating equilibrium that leads to a policy that is different from the status quo. Accordingly, an optimal proposal for L would be the status quo itself (or any other proposal that is rejected).

[6] Assuming that party C has full bargaining power changes the specific equilibrium policies, but neither the existence of separating and pooling equilibria for the various cases, nor the outcome of the payoff comparison in section 6. An analysis of this case, which we have skipped to avoid additional case distinctions, is available from the authors upon request.

It remains to be analyzed whether L has a profitable deviation. For a moderate rightist shock, we have shown in section 4.1 that this is indeed the case if L governs alone. In the coalition government, the equilibrium policy for a leftist shock and $a_C < b$ is $x_l^* = \max\{-2b, 2a_C - 2b\} < 0$. Even with a rightist shock party L would prefer this outcome to the equilibrium policy for a rightist shock, which leads to the status quo (due to $a_L + b < -b$). In the case of a single-party government, this induced L to lie about the direction of the shock. However, if L were to do so in the coalition – i.e., propose the leftist equilibrium policy although the shock has been rightist – this proposal would now be vetoed by the coalition partner C. To see this, we have to distinguish two cases. First, suppose $x_l^* = \max\{-2b, 2a_C - 2b\} = -2b$. By Assumption 3, $a_c + b > -b$, so that 0 is closer to C's bliss point with a rightist shock than $-2b$. Moreover, the alternative case, $x_l^* = \max\{-2b, 2a_C - 2b\} = 2a_C - 2b$, requires $a_C > 0$. Hence in the coalition government lying about the direction of the shock no longer constitutes a profitable deviation for party L.[7]

PROPOSITION 3 (SEPARATING EQUILIBRIUM IN COALITION GOVERNMENT)

(a) For a moderate or large leftist shock, the equilibrium policy is $x_l^* = \max\{-2b, 2(a_C - b)\}$, *provided that* $a_C < b$. *By contrast, if* $a_C \geq b$ *then there will be no reforms. This is also the outcome for moderate and large rightist shocks.*

(b) For an extreme leftist shock, the equilibrium policy is $x_l^* = \max\{a_L - b, 2(a_C - b)\}$. *For an extreme rightist shock, it is* $x_r^* = a_L + b$.

(c) No other separating PBE exists that has reasonable beliefs.

The above elaborations focused on the case where party C formed a coalition with L. In section 6, this will enable us to compare L's payoff in a single-party and in a coalition government. Nevertheless, the assumptions on the parties' preferences do not preclude that C's preferences are closer to those of R. In this case one might argue that a coalition of C and R is more likely to emerge. It is straightforward to see that the coalition outcome would be essentially the same, but with the effects of a leftist and a rightist shock being exchanged.

5.2 Analysis of Pooling Equilibrium with Coalition

In a pooling equilibrium the median voter's beliefs equal his priors, so that he would not accept a policy proposal that differs from the status quo (see section 4.2). We can distinguish two cases. First, consider shocks for which a separating equilibrium exists. It follows straightforwardly from the previous section that such a separating equilibrium is preferred by the coalition partners L and C over any candidate for

[7] The same argument applies for large shocks. In particular, if the leftist equilibrium policy is $x_l^* = \max\{-2b, 2a_C - 2b\} = 2a_C - 2b$, then L might prefer this to the status quo (the equilibrium outcome if a rightist shock is signaled). However, $2a_C - 2b > -2b$ implies $a_C > 0$, so that C would veto the leftist proposal if the shock has been rightist.

a pooling equilibrium.[8] For any such candidate that has reasonable beliefs, we show in the Appendix that a profitable deviation to the policy in the separating equilibrium exists.

Second, consider the cases where no separating equilibrium exists. From the previous section this happens for moderate and large shocks if $a_C \geq b$. Moreover, we have shown that for these cases any leftist proposals would be vetoed by C and rightist proposals by L. Hence $x_p^* = 0$ is a pooling equilibrium, for which no profitable deviations exists, regardless of the voters' beliefs.

PROPOSITION 4 *In a coalition government, a pooling PBE that has reasonable beliefs only exists if $a_C \geq b$ and the shock is moderate or large. It leads to the status quo.*

6 Comparison of Single-Party and Coalition Government

6.1 Implementability and Size of Reforms

The accompanying table shows all pooling and separating equilibria for the different combinations of shocks, government structures, and preferences a_C, as they have been derived in Propositions 1 to 4. Based on this table, it is straightforward to compare the implementability and size of reforms under single-party and coalition governments. The following proposition summarizes the main results.

Table
Summary of Equilibrium Outcomes

Shock	Party L	Coalition	
moderate	$x_p^* = 0$	$a_C \leq 0$: $a_C \in (0, b)$: $a_C \geq b$:	$x_l^* = -2b, x_r^* = 0$ $x_l^* = 2a_C - 2b, x_r^* = 0$ $x_p^* = 0$
large	$x_l^* = -2b$ $x_r^* = 0$	$a_C \leq 0$: $a_C \in (0, b)$: $a_C \geq b$:	$x_l^* = -2b, x_r^* = 0$ $x_l^* = 2a_C - 2b, x_r^* = 0$ $x_p^* = 0$
extreme	$x_l^* = a_L - b$ $x_r^* = a_L + b$	$x_l^* = \max\{a_L - b, 2a_C - 2b\}$ $x_r^* = a_L + b$	

PROPOSITION 5 (COMPARISON OF REFORMS)

(a) Reforms always have the same direction as the shock. However, if party L governs alone, then reforms are more leftist than the voters would prefer, and (weakly) more leftist than under the coalition government.

[8] If their payoff in the separating equilibrium were worse than in the status quo, then they would have vetoed the policy proposal.

(b) For moderate shocks, the coalition is more successful in implementing reforms. For large shocks, the single-party government is more successful. Extreme shocks always lead to reforms, independently of the government structure.

The first result shows that party L can impose its leftist policy preferences on the voter only to a limited extent, despite its private information about the direction of the shock. Specifically, reforms tend to be overly leftist, but they have the same direction as the shock. The reason is that voters anticipate situations where party L would prefer a leftist reform despite a rightist shock. In such cases, a coalition partner with more centrist preferences may improve the government's credibility and permit reforms that would not have taken place otherwise. However, if the shock is sufficiently large, it dominates L's policy preferences, so that L no longer has an incentive to lie about the direction of the shock. In such a case, a coalition partner is detrimental for reforms, due to the traditional veto-player argument. Finally, if the shock is sufficiently extreme, it overrides all other aspects and always triggers a reform.

6.2 Payoffs

We now compare the players' payoffs in the single-party and the coalition government from an ex ante perspective, i.e., before the realization of the shock. We focus on intuition and relegate a formal proof of the proposition below to the Appendix.

For the voters we apply a utilitarian welfare function. Given Assumption 3 that voters' policy preferences are equally distributed on the interval $[\underline{a}, \overline{a}]$ with $\overline{a} + \underline{a} = 0$, the welfare of the voters becomes

$$W = \frac{1}{\overline{a} - \underline{a}} \int_{\underline{a}}^{\overline{a}} -\left[x - \left(\gamma + \tilde{a}_i\right)\right]^2 d\tilde{a}_i \,,$$

where $(\gamma + \tilde{a}_i)$ is the bliss point of a voter i. Integrating out yields

$$W = -(x - \gamma)^2 - \frac{1}{3}\overline{a}^2 \,.$$

Accordingly, the welfare function is a monotonic transformation of the median voter's utility function, where the former is simply reduced by $\overline{a}^2/3$. Therefore, welfare maximization is equivalent to maximizing the median voter's utility.[9]

We start the payoff comparison by considering moderate shocks. If $a_C \geq b$, then the status quo prevails in the coalition government, which is also the policy outcome if party L governs alone. Hence payoffs are the same for the two parties and the voters. The more interesting case is $a_C < b$. Intuitively, all players must be (weakly) better off in the coalition government, because they could have implemented the status quo in this regime too, either by suggesting it (party L) or by rejecting a different proposal (party C and the median voter). Specifically, all players benefit from the coalition because it enables the government to implement a leftist reform if a leftist shock has occurred, which is not the case if party L governs alone.

[9] Welfare declines with increasing support because the distance between the implemented policy and the individual voters' bliss points then increases.

Turning to large shocks, the equilibrium outcome in a coalition is the same as with moderate shocks. However, now there also exists a separating equilibrium when L governs alone, for which policy x_l^* is more leftist than in the coalition government if $a_C \in (0, b)$. This is beneficial for L, but not for the centrist party C and the median voter.

Finally, in the case of extreme shocks we can distinguish two cases. The equilibrium and, therefore, payoffs are the same under the single-party and the coalition government if $x_l^* = \max\{a_L - b, 2a_C - 2b\} = a_L - b$. This is the case where the shock is extreme enough to dominate the policy decision regardless of the government structure. Alternatively, suppose $x_l^* = 2a_C - 2b$. Now party L can implement its bliss point only if it governs alone; hence it prefers this over a coalition. For this coalition we have shown that C would veto L's bliss point. Moreover, the voter is just indifferent between $x_l = 0$ and $x_l = -2b$. Hence he must prefer $2a_C - 2b < 0$, which lies in between these two extremes (due to $2a_C - 2b > a_L - b \geq -2b$ for extreme shocks). In conclusion, party C and the voter are both better off under the coalition government.

PROPOSITION 6 (COMPARISON OF PAYOFFS)

(a) For moderate shocks, payoffs of both parties and welfare of the voters are (weakly) higher in a coalition government than if party L governs alone.

(b) For large shocks, payoffs in a coalition government are (weakly) higher for party C and the voters, but (weakly) lower for party L, than in the single-party government.

(c) For extreme shocks, there are two cases. If $x_l^* = 2a_C - 2b$, then payoffs in a coalition government are (weakly) higher for party C and the voters, but (weakly) lower for party L, than in the single-party government. Alternatively, if $x_l^* = a_L - b$, then the equilibrium is the same under both government structures.

7 Oversized Coalitions and External Cabinet Members

In the preceding analysis, the outcome of the national elections was such that parties had to form a coalition government in order to obtain a majority. Now we consider an alternative scenario in which party L has a majority on its own, but can invite an external partner with preferences a_C into its government. This may be another party – leading to an oversized coalition – or a minister who is not a member of party L. Therefore, the decision to invite an external partner is a strategic choice of L. Similarly, the external partner C may accept or reject joining the government.

Allowing for these decisions, the timing of the game after the elections is as follows:

(1) Party L, which has a majority on its own, decides whether to invite an external partner with preferences a_C into the government.
(2) The external partner decides whether to join the government.
(3) Nature draws type $\gamma \in \{b, -b\}$ with probabilities 0.5, respectively.
(4) The game continues as outlined at the end of section 3.

Accordingly, the decision whether to form a heterogeneous government takes place from an ex ante perspective, i.e., before the direction and size of the shock are known. This complicates the comparison of (expected) payoffs, particularly as these also depend on the specific value of the players' individual policy preferences. Nevertheless, assuming that parties opt for the coalition if they are indifferent about the government structure, some cases exist for which clear-cut results can be obtained.

PROPOSITION 7 *(a) If $a_C \leq 0$, then the equilibrium government structure is a coalition. (b) If $a_C \geq b$, then the equilibrium government structure is the single-party government.*

In the remaining case of $a_C \in (0, b)$, the government structure depends on the ex ante probability of the size of the shocks and on the specific values of the players' individual policy preferences. In particular, we know from Proposition 6 that party C (weakly) prefers the coalition government for all possible sizes of the shock. This reflects that it can influence the policy proposal only in a coalition.

By contrast, party L prefers the coalition only in the case of a moderate leftist shock. Moreover, this preference is strict, as follows immediately from the Table and L's preference for a leftist policy. Therefore, party L will choose to invite C into a coalition government only if the ex ante probability that the shock is moderate is sufficiently high.

The second parameter that determines this decision is the exact location of a_C. In particular, the larger a_C, the more rightist the equilibrium policy in a coalition. Ceteris paribus, this makes the coalition less attractive for party L. This is also the intuition that underlies the results in Proposition 7. Party L prefers to have a coalition partner if its preferences are sufficiently leftist (i.e., $a_C \leq 0$), but prefers to govern alone if the partner's preferences are too rightist (i.e., $a_C \geq b$). Nevertheless, observe that we have not imposed a lower bound on a_L. Therefore, a coalition may be formed even if the parties' policy preferences are very different.

8 *Conclusions*

In this paper we have developed a model in which sharing decision power and the resulting need to find a compromise can increase credibility and therefore can be beneficial even for the party that gives up decision power. We apply this general idea to the comparison of different government structures and show that heterogeneity in policy preferences within a government facilitates the credible transmission of information about the necessity of policy reforms. In particular, when there is asymmetric information between voters and policymakers, differences in policy preferences are a safeguard against reforms that are – from the point of view of the median voter – too much biased toward the interests of an ideologically driven single party. Therefore, heterogeneous governments consisting of parties with diverse policy preferences may find it easier to implement policy reforms than

more homogeneous ones do, despite the larger number of veto players. By contrast, if the preferences of the coalition partners are too far in the opposite direction, then the traditional veto-player argument applies and a coalition partner hinders the implementation of reforms.

Specifically, we showed that forming a coalition with a centrist party facilitates policy reform for a leftist party if the shock is moderate relative to that party's inherent policy preferences. This is the case even if the preferences of the leftist and the centrist party are very close to each other (i.e., close to $-2b$). Thus, the result is not driven by the fact that the aggregated preferences of the coalition are closer to the preferences of the median voter than are those of party L. Rather, the crucial point is that the centrist party controls the leftist party's desire to implement a leftist policy unless it is actually supported by a policy shock in that direction. Accordingly, by approving a policy the coalition partner signals the necessity of a policy reform to the voter.

Furthermore, we use the idea of gaining credibility by sharing decision power to rationalize the formation of oversized coalitions and the inclusion of cabinet members from opposing parties into a government. We show that such behavior is always advantageous for a ruling leftist party if the policy preferences of the centrist party are the same as or to the left of the median voter's policy preference. If this is not the case, then the disadvantage of having to find a compromise with a partner that has different preferences may dominate. Hence the ruling party prefers to govern alone if preferences of the centrist party are sufficiently rightist.

Appendix

A.1 Proof of Proposition 1

It only remains to be shown that (*i*) the mentioned separating PBEs survive the equilibrium-dominance-based refinement, and (*ii*) no other separating PBE does so.

Statement (*i*). For extreme shocks L can implement its bliss point. For a large leftist shock, L cannot implement a more preferred policy than $x_l^* = -2b$, regardless of the voters' beliefs off the equilibrium path. Hence in both cases there cannot exist a profitable deviation. It remains to consider a large rightist shock, which leads to no reforms in equilibrium, while L would prefer a leftist policy $x_p \in (2(a_L + b), 0)$, where $2(a_L + b) > -2b$ by the definition of large shocks. However, any policy $x_p \in (2(a_L + b), 0)$ is equilibrium-dominated in the case of a leftist shock (i.e., it yields a payoff below party L's equilibrium payoff with a shock of type $-b$). Hence reasonable beliefs must satisfy $\Pr[-b|x_p \in (2(a_L + b), 0)] = 0$, so that no profitable deviation exists.

Statement (*ii*). *Large shocks:* By contradiction, suppose there exists an alternative separating PBE with equilibrium policy $x_l^* > -2b$ and $x_r^* > x_l^*$. In the case of a rightist shock, L's bliss point is $a_L + b \in (-b, 0)$, but the voter will reject any equilibrium

proposal $x_r^* < 0$. Accordingly, in a separating PBE a rightist shock cannot lead to reforms. Moreover, for $\gamma = b$ party L prefers this equilibrium outcome over the policy $-2b$, so that the proposal $x_p = -2b$ is equilibrium-dominated. Hence reasonable beliefs must satisfy $\Pr[-b|x_p = -2b] = 1$. Given these beliefs, the voter would accept a proposal $x_p = -2b$, which therefore constitutes a profitable deviation, in the case of a leftist shock, from any alternative separating PBE with equilibrium policy $x_l^* > -2b$.

Extreme shocks: By contradiction, suppose there exists an alternative SE with equilibrium policy that differs from L's bliss point, i.e., $x_l^* \neq a_L - b$. If $\gamma = b$, then any policy $x_p < 0$ is equilibrium-dominated (i.e., yields a lower payoff than the equilibrium policy x_r^*, because the latter must yield at least the payoff in the status quo). Hence the voters' beliefs off the equilibrium path must satisfy $\Pr[-b|x_p = a_L - b] = 1$. Therefore, $x_p = a_L - b$ constitutes a profitable deviation in the case of a leftist shock. An equivalent argument excludes equilibrium candidates $x_r^* \neq a_L + b$. *Q.E.D.*

A.2 Proof of Proposition 2

It remains to be proved that for large and extreme shocks no pooling PBE exists that has reasonable beliefs. We have already shown that there cannot be a pooling PBE that differs from the status quo. Moreover, if $\gamma = b$, then for large and extreme shocks L prefers the status quo over a policy $\max\{-2b, a_L - b\}$. Accordingly, the policy proposal $x_p = \max\{-2b, a_L - b\}$ is equilibrium-dominated for $\gamma = b$, so that reasonable beliefs must satisfy $\Pr[-b|x_p = \max\{-2b, a_L - b\}] = 1$. Hence if $\gamma = -b$, then $x_p = -2b$ constitutes a profitable deviation in the case of a large shock, and $x_p = a_L - b$ in the case of an extreme shock. *Q.E.D.*

A.3 Proof of Proposition 3

It remains to be shown that (*i*) the mentioned separating PBEs survive the equilibrium-dominance-based refinement, and that (*ii*) no other separating PBE does so.

Statement (*i*). By construction, for leftist and extreme rightist shocks L cannot implement a more preferred policy than the equilibrium policy, regardless of the voters' beliefs off the equilibrium path. Hence there cannot exist a profitable deviation in these cases. Next, consider large and moderate rightist shocks, which lead to no reforms in equilibrium, while L would prefer a leftist policy $x_p \in (2(a_L + b), 0)$. Obviously, for $a_C + b \geq 0$ such proposals would be rejected by C. Alternatively, suppose $a_C + b < 0$. Now, any policy $x_p < 2(a_C + b)$ would be rejected by C, and any policy $x_p \in (2(a_C + b), 0)$ is equilibrium-dominated in the case of a leftist shock (i.e., it yields a payoff below party L's equilibrium payoff with a shock of type $-b$). This follows from the construction of the separating SE, where we have identified L's most preferred policy that it can implement if it successfully signals a leftist

shock. Hence reasonable beliefs must satisfy $\Pr[-b|x_p \in (2(a_C + b), 0)] = 0$, so that no profitable deviation exists.

Statement (*ii*). First consider large and moderate shocks. In any separating PBE, rightist shocks lead to no reforms, because the voter prefers a rightist and L a leftist policy. Moreover, by construction the separating PBE mentioned in the proposition is the most preferred one that L can implement. It also has reasonable beliefs. Hence, for any alternative equilibrium policy x_l^*, party L would have a profitable deviation. For the same reason, this is also the case for extreme shocks. The only difference is that a profitable deviation would also exist for a different rightist policy proposal (see the proof of Proposition 1 for a more extensive elaboration of the argument). *Q.E.D.*

A.4 Proof of Proposition 4

It remains to be proved that for moderate and large shocks with $a_C < b$ as well as for extreme shocks, no pooling PBE exists that has reasonable beliefs. For extreme shocks, L prefers the status quo (the outcome in a pooling PBE) over a leftist policy if $\gamma = b$. Accordingly, reasonable beliefs must satisfy $\Pr[-b|x_p = \max\{a_L - b, 2(a_C - b)\}] = 1$. Hence in a pooling PBE this policy would constitute a profitable deviation if $\gamma = -b$.

Next, for moderate and large shocks with $a_C < b$ at least one of the coalition members prefers the status quo (the outcome in a pooling PBE, and in a separating PBE for a rightist shock) over a policy $\max\{-2b, a_C - b\}$ if $\gamma = b$. Otherwise, the coalition would have suggested the latter policy also in the case of a rightist shock. Hence reasonable beliefs must satisfy $\Pr[-b|x_p = \max\{-2b, a_C - b\}] = 1$, so that these policies would constitute a profitable deviation if $\gamma = -b$. *Q.E.D.*

A.5 Proof of Proposition 6

Moderate shocks: The expected payoff of party i, $i = C, L, m$, in a coalition government is

$$E[u_i] = -0.5(-b - a_i)^2 - 0.5\big(x_l^* + b - a_i\big)^2, \tag{A1}$$

where x_l^* is the equilibrium policy in the case of a leftist shock as specified in Proposition 3 (see also the Table). By contrast, when L governs alone, there will be no reforms and the parties' expected payoff is $-0.5(-b - a_i)^2 - 0.5(b - a_i)^2$. Comparing this, party i (weakly) prefers the coalition government iff

$$\begin{aligned} & -\big(x_l^* + b - a_i\big)^2 \geq -(b - a_i)^2 \\ \iff \quad & x_l^*\big[x_l^* + 2(b - a_i)\big] \leq 0\,. \end{aligned}$$

Given that $x_l^* < 0$, this requires that the factor in square brackets be nonnegative. From the Table there are two cases. Either $a_C \leq 0$, which implies $x_l^* + 2(b - a_i) = -2a_i \geq 0$, $i = C, L, m$; or $a_C \in (0, b)$, which implies $x_l^* + 2(b - a_i) = 2a_C - 2a_i \geq 0$, $i = C, L, m$, by Assumption 2.

Large shocks: The equilibrium outcome in a coalition is the same as with moderate shocks, so that the expected payoffs are again given by (A1), except that x_l^* must be replaced by the pooling policy x_p^* if $a_C \geq b$. By contrast, when L governs alone, the expected payoffs are

$$E[u_i] = -0.5(-b - a_i)^2 - 0.5(-2b + b - a_i)^2 , \tag{A2}$$

If $a_C \leq 0$, so that $x_l^* = -2b$, then the equilibria and, therefore, payoffs are the same under both government structures. In the other cases, comparing (A2) and (A1) yields that player i weakly prefers the coalition government iff

$$x_l^* \left[x_l^* + 2(b - a_i)\right] \leq 4ba_i . \tag{A3}$$

If $a_C \geq 0$, so that the coalition leads to a pooling equilibrium with $x_p^* = 0$, this is trivially satisfied for all players. Alternatively, if $a_C \in (0, b)$ then $x_l^* = 2a_C - 2b$ and the condition (A3) becomes

$$\begin{aligned} &(2a_C - 2b)[2a_C - 2a_i] \leq 4ba_i \\ \iff \quad &a_C(a_C - a_i - b) \leq 0 . \end{aligned}$$

Remembering that $a_C \in (0, b)$ and $-a_L - b > 0$ from the case distinction, we obtain that this is satisfied for $i = C, m$, but violated for $i = L$. *Q.E.D.*

A.6 Proof of Proposition 7

For $a_C \leq 0$, one obtains $x_l^* = -2b$ for moderate and large shocks, while $\max\{a_L - b, 2a_C - 2b\} = a_L - b$ for extreme shocks. Accordingly, for large and extreme shocks both government structures lead to the same separating equilibria. Moreover, from Proposition 6 both parties (weakly) prefer the heterogeneous government in the case of moderate shocks.

Next, suppose $a_C \geq b$. For moderate shocks, the same pooling equilibrium arises under both government structures. For large shocks, signaling succeeds only in the single-party government; hence L strictly prefers this government structure. Finally, for extreme shocks L can implement its bliss point, regardless of the direction of the shock, if it governs alone. Hence its payoff in the coalition government cannot be higher. *Q.E.D.*

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